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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/692,665

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Nitin Muppalaneni

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EXAMINER

DOAN, DUC T

ART UNIT

PAPER NUMBER

2188

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/692,665

Applicant(s)

MUPPALANENI ET AL.

Examiner

Duc T. Doan

Art Unit

2188

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 March 2007.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-34 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-34 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Status of Claims***

Claims 1-34 have been presented for examination in this application. In response to the last office action, none of the claims have been amended. As the result, claims 1-34 are pending in this application.

Claims 1-34 are rejected.

Applicant's remarks filed 2/26/07 have been fully considered but they are not persuasive. Therefore, the rejections from the previous office action are respectfully maintained and restated below,

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

A person shall be entitled to a patent unless -

(a) the invention was known or used by other's in this country or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another

who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 1,8,13-15,19,24-26,30,32-34 are rejected under 35 U.S.C. 102 (a) as being anticipated by Tehloh et al (US 2003/0014523).

As in claim 1, Tehloh discloses a method for mirroring data on a first storage server and a second storage server, the method comprising: queuing write commands at the first storage server between consistency points, the write commands being to write data corresponding to a file system of the first storage server to a local mass storage device coupled to the first storage server (Tehloh's Fig 1 discloses data replicating (i.e mirroring paragraph 44) in which data and commands are queued in the local replication facility ; subsequently data is written to local storage (paragraph 45, Fig2: #24) ;

at a start of each consistency point, sending the write commands to the local mass storage device and to a remote mass storage device coupled to the second storage server;

updating memory blocks of the local and remote mass storage devices based on the write commands (Tehloh's Fig 2: #34, #42 discloses writing data to the local and remote storage); and

Tehloh's further disclose at an end of each consistency point constructing a representation to reference each memory block of the local mass storage device that is in use to represent the file system (Tehloh's paragraph 45 discloses building the data structures representing memory blocks such as bit map); and sending at least a portion of the representation to the second storage server (Tehloh's paragraph 46 discloses sending this replicated data package information that identifies the storage locations of memory blocks including information such as volume path).

Claims 8,19 rejected based on the same rationale as of claim 1.

As in claim 13, Tehloh discloses receiving high-level write requests from a client served by the first storage server, the high-level request requires changes to the file system (Tehloh's Fig 1 discloses local storage server Fig 1: 20 receiving a write requests to data in a file stored at volume #100 in local storage device #24); generating block-level write commands to update memory blocks of a local mass storage device coupled to the first storage server, based on the high-level write request; queuing the block-level write commands (Tehloh's paragraph 48 discloses queuing write commands and subsequently issue write commands to local storage devices to write and updating data blocks; and sending the data write package to the remote storage (Tehloh's paragraph 46)).

As in claim 14, Tehloh's discloses the receiving and the updating is performed at each consistency point (Tehloh's paragraph 46 lines 13-24).

As in claim 15, Tehloh discloses receiving at the end of each consistency point, a representation of each memory block currently in use to represent an active state of the file system (Tehloh's paragraph 46 discloses the remote storage receiving the data package information including the information such as volume path that representing the active state of the file system).

Claim 24 rejected based on the same rationale as of claim 13.

Claims 25,33 rejected based on the same rationale as of claim 14.

Claim 26 rejected based on the same rationale as of claim 15.

Claim 30 rejected based on the same rationale as of claim 8.

Claim 32 rejected based on the same rationale as of claim 13.

As in claim 34, Tehloh discloses in the first storage server, constructing a representation to reference each memory block used to store a file system, the memory blocks being part of the first set of mass storage devices (Tehloh's paragraphs 45-46 discloses constructing data structures that represent the referencing to memory blocks in a file system (i.e bit map and volume path), the memory blocks are stored in the first mass storage device (Fig 1: #24),

Tehloh further discloses sending at least a portion of the representation to a second storage server, said portion comprising information to allow reconstruction of the entire representation by the second storage server so that the second storage server has a representation of memory blocks of a second set of mass storage devices comprising at least one mass storage device coupled locally to the second storage server used to store the file system (Tehloh's paragraph 46 discloses the local data replication facility sending information in the data package including volume path and the data to the remote data replication facility so that the data can be stored in the second set of mass storage device Fig 1: #26, #102).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-7,9-12,16-18,20-23,27-29,31,35 are rejected under 35 U.S.C. 103(e) as being unpatentable over Tehloh et al (US 2003/0014523) as applied to claims 1, 8,14,15,19,26,30,34 and further in view of Guthrie (2005/0010592).

Tehloh does not expressly disclose the details in claims 2-4. However, Guthrie disclose a snapshot system wherein the memory blocks of storage devices are represented by hierarchical files/nodes including directory nodes (i.e nodes/memory blocks with address pointers) and leaf data blocks in a file system (paragraph 16), these nodes includes the root nodes for the multiple snapshot copies, these nodes are organized as sub-tree in a hierarchical manner (Fig 7, Guthrie's paragraph's 16 lines 7-11). It would have been obvious to one of ordinary skill in the art at the time of invention to include the hierarchical structures to representing the memory blocks being used in copying as suggested by Guthrie in Tehloh's system such that only root nodes and nodes that are being modified are copied (Guthrie's paragraph 16 lines 26-30), thereby the snapshot procedure can be done with significant saving in space and time (Guthrie's paragraph 3 lines 18-23).

As in claim 5, Tehloh's paragraph 46 discloses sending this replicated data package information that identifies the storage locations of memory blocks including information such as volume path (i.e contains root node information). Notes that the detail of using root nodes in the snapshot procedure is further disclosed by Guthrie's Fig 7, paragraph 17).

As in claims 6-7, Tehloh does not expressly disclose the claims' detail limitation, however, Guthrie discloses a scheme in which a memory block referenced within a

representation is not overwritten (Gutherie's paragraph 3); allowing read-only access to the remote mass storage device while updating the memory blocks of the remote mass storage (Gutherie's paragraph 26 discloses by using the snapshot hierarchical nodes as disclosed in Fig 5, the data access from the host can be served by traversing the roots nodes and determines which data blocks being updating (i.e current snapshot), and which data blocks have been snapshot in previous snapshot points).

Claims 9-10 rejected based on the same rationale as of claim 3.

Claim 11 rejected based on the same rationale as of claim 4.

Claims 12,23 rejected based on the same rationale as of claim 5.

Claims 16,27 rejected based on the same rationale as of claim 6.

As in claim 17, Tehloh does not disclose the claim's detail. However, Gutherie's Fig 7 discloses the representation comprises a root node for a tree that includes nodes representing the memory block currently in use by the file system (Fig 7: #701 file system to be snapshot). It would have been obvious to one of ordinary skill in the art at the time of invention to include the hierarchical structures to representing the memory blocks being used in copying as suggested by Gutherie in Tehloh's system such that only root nodes and nodes that are being modified are copied (Gutherie's paragraph 16 lines 26-30), thereby the snapshot procedure can be done with significant saving in space and time (Gutherie's paragraph 3 lines 18-23).

Claims 18,29 rejected based on the same rationale as of claim 2.

As in claim 20, Gutherie's Fig 7 discloses the representation comprises a sub-tree structure in which each node references a memory block in use by the system (Fig 7, paragraph 16, data blocks stored in files referenced by nodes).



As in claim 22, Guthrie's paragraph 16 discloses each sub-tree structure corresponding to a representation constructed at a particular consistency point is root in a root node (each snapshot representing at a particular consistency point a root node of the sub-tree of nodes involved in the snapshot, see paragraph 16).

Claims 28,31 rejected based on the same rationale as of claim 17.

As in claim 35, Tehloh does not disclose the claim's detail, However Guthrie discloses a method maintaining multiple snapshots data structures (Fig 7: #701, #702), such that synchronization can be readily processed for each snapshot by traversing the snapshots tree structures (Guthrie's paragraph 26). It would have been obvious to one of ordinary skill in the art at the time of invention to include the hierarchical structures to representing the memory blocks being used in copying as suggested by Guthrie in Tehloh's system such that only root nodes and nodes that are being modified are copied (Guthrie's paragraph 16 lines 26-30), thereby the snapshot procedure can be done with significant saving in space and time (Guthrie's paragraph 3 lines 18-23).

### ***Response to Arguments***

As to Applicant's remarks on pages 11-13 for the rejections of claims 1,8,13,19,24,30,32 and 34 under 35 U.S.C 102(a),

A) Applicant argues on page 12 lines 15-17 "...the event of saving the modified data to the mass storage device is called a "consistency point" .. and "Teloh contains no discussion regarding the concept of consistency point". Examiner disagrees. Teloh's paragraphs 44 clearly

teaches that when both local and remote storage devices are not synchronized, **all local writes are logged** and awaiting for the reestablishment of the remote mirror process (see Teloh's paragraph's 44 lines 1-9). **When re-synchronize event occurs** (corresponding to the claim's the start of consistency point), the local writes, being queued in the log, are retrieved from the log and executed as disclosed in Teloh's Fig 2. The **re-synchronizing process as discloses in Fig 2** comprises **writing to the local storage** device, see Fig 2: #34 data is written to storage device from the local site Fig 7: #12 to local mass storage device #24. The data writes taught by Teloh must have both write command and write data portions. Since without a write command portion, the circuitry would not know what to do with the write data.

Furthermore Fig 2 shows that for every re-synchronization event, the entire process of Fig 2 is executed. Therefore Teloh clearly teaches the claim's limitation of ".queuing write commands between consistency points..".

B) Teloh further discloses the re-synchronizing process comprises the step of sending the write command to the remote storage device Fig 2: #36, again inherently a write command must be sent to the remote storage device. Since without a write command portion, the circuitry would not know what to do with the write data. Teloh's paragraph 49 further teaches the write command included in the package sending/forwarding to the remote host (i.e the write command that the local site receives in its log/queue), which also includes other information such as storage location at the remote host (Teloh's paragraph 49 lines 3-5). Once the remote site received the write command, it starts requesting for the associating data (Teloh's paragraph 49 lines 7-10).

C) Independent claims 8,19,24 and 30 are rejected based on the same rationale as discussed in above paragraphs.

D) Regarding Applicant's remarks on page 13 lines 7-14 for the rejection of claims 13,32. The claims are rejected based on the same rationale as discussed in above paragraphs.

E) Regarding Applicant's remarks on page 13 line 15 to page 16 line 10 for the rejection of claim 34, Examiner maintains that Teloh's paragraph 46 teaches the claim limitation "...allow reconstruction of the entire representation by the second storage server so that the second storage server has a representation of memory blocks of a second set of mass storage devices comprising at least one mass storage device coupled locally to the second storage server used to store the file system". (Teloh's paragraph 46 discloses the local data replication facility sending information in the data package including volume path and the data to the remote data replication facility so that the data can be stored in the second set of mass storage device Fig 1: #26, #102). Using the **volume path** and the bit map of location data blocks, this information allows reconstruction of the entire representation as recited in the claim.

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP 706.07(a). Applicant is reminded of the extension of time policy as set forth in 36 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after


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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

When responding to the office action, Applicant is advised to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist examiner to locate the appropriate paragraphs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Duc T. Doan whose telephone number is 571-272-4171. The examiner can normally be reached on M-F 8:00 AM 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung S. Sough can be reached on 571-272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

  
HYUNG SOUGH  
SUPERVISORY PATENT EXAMINER  
3-27-07